

## REMARKS

In the present Office Action, the Examiner objects to the numbering of the claims as altered by the Applicant's Preliminary Amendment filed on June 22, 2003. The Examiner also objects to independent claims 65 and 66 as they appear to have been intended to depend on some other method or apparatus claim. Additionally, the Examiner rejects claims 69 and 70 under §102(b) as being anticipated by Ross et al. (U.S. Patent No. 5,799,720) and claims 1, 65-67 under §103(a) as being unpatentable over admitted prior art in view of Kagan et al. (U.S. Patent No. 5,728,036) (the '036 patent). Finally, the Examiner allows claims 47-64 and 68 at least because none of the cited or applied prior art shows or fairly suggests the employment of neo-magnets in continuous casting or other molten metal flow control processes and devices in the claimed arrangements.

The Applicant thanks the Examiner for his thorough examination of the present application. The Applicant believes that it has addressed the Examiner's objections and traversed the rejections such that all currently pending claims are allowable, as discussed in greater detail below.

### Claim Objections

Applicant appreciates and acknowledges that the Examiner has properly renumbered the claims such that new claims 61-84 contained in the Preliminary Amendment are now claims 47-70. Applicant has included a complete set of amended claims with the new numbering. Per the Examiner's request, Applicant has amended independent claim 65. Claim 65 now depends on claim 63. *All elements of claim 65 are present in claim 63.* Claim 66 depends on claim 65 incorporating the limitations of claim 63. In light of the above, Applicant believes it has addressed the Examiner's objections with regard to claims 65 and 66. Applicant has amended the claims for clarification purposes only.

Claim Rejections – 35 U.S.C. §102

The Examiner has rejected claims 69 and 70 as being anticipated by Ross et al. (5,799,720). The Applicant has cancelled claims 69 and 70 obviating the Examiner's rejection.

Claim Rejections – 35 U.S.C. §103

The Examiner has rejected claims 1 and 65-67 under §103(a) as being unpatentable over the admitted prior art, publications by L. R. Blake ("Blake") and D. A. Watt ("Watt"), of page 3 of the instant disclosure in view of Kagen et al. (U.S Patent No. 5,728,036).

Kagan discloses elongated finned backup rollers have multiple magnetized fins for rolling contact with a moving endless, flexible, thin-gauge, heat-conducting, magnetically soft ferromagnetic casting belt for guiding and stabilizing the belt against thermal distortion while it moves along the mold cavity being heated at its front surface by heat from molten metal while being cooled at its reverse surface by flowing liquid coolant. Each finned backup roller includes an elongated, non-magnetic shaft rotatable around its axis and having multiple annular fins of magnetically soft ferromagnetic material fitted onto the shaft spaced along the shaft. The fins have circular perimeter rims for rolling contact with the reverse surface of a belt. Intervening collar shaped reach-out permanent magnets are mounted on the shaft between successive fins. The fins and reach-out collar magnets alternate in sequence along the length of the roller. The reach-out collar magnets are magnetized in a direction parallel with the axis of the roller. Thus, fins become magnetized by the magnets with their perimeters having alternate North and South magnetic polarities in sequence along the roller. In addition to attraction of the belt by magnetic flux which passes through small localized rim-contact regions where fin rims are rolling on the belt surface, the belt also is attracted toward the fins by reach-out magnetic flux extending out in three-dimensional patterns toward the belt from the rim and also from tapered side surfaces of each fin.

The L.R. Blake and D. A. Watt references describe pumps used for pumping molten sodium or potassium as coolant through cores of atomic reactors. Their pumps

were quite inefficient requiring 100,000 amperes to pump 2,000 gallons of an extremely light liquid metal.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. See M.P.E.P. § 2143. Applicant believes that the references cited do not teach or suggest the additional claim limitation.

With regard to Claim 1, the Applicant has amended the claim to include first and second assemblies of neo-magnets comprising a rare-earth element. The assemblies are positioned on opposite sides of the conduit and provide magnetic flux extending through the working area in a direction generally perpendicular to flow of molten metal in the working area and the flow of direct current. The first and second assemblies of neo-magnets including first and second pole pieces of magnetically soft ferromagnetic material respectively positioned on opposite sides of said conduit. The Applicant amended the claim for clarification purposes only. Support for the amendment is found on page 13 of the application. No new matter has been entered.

Applicant respectfully asserts that the combination of Kagan, Blake and Watt, teaches or suggests multiple elements of amended claim 1. Specifically, the references do not teach or suggest first and second assemblies of neo-magnets that include first and second pole pieces of magnetically soft ferromagnetic material positioned on opposite sides of a conduit. Kagan includes annular fins of magnetically soft ferromagnetic material. *See* Kagan, FIG. 1. However, the annular fins are located on non-magnetic rotatable shaft and are not located on opposite sides of a conduit. *See* Kagan, FIG. 1, Abstract. As such, the Applicant respectfully asserts that amended claim 1 is allowable.

The Applicant has amended claim 65 so that it is allowable as well. Amended claim 65 now depends on claim 63. The Examiner has allowed claim 63 stating that the cited or applied prior art does not show or fairly suggest the employment of neo-magnets in continuous casting of other molten metal flow control processes in the arrangement claimed therein. Claim 65 contains the limitations of allowed claim 63 including its configuration of neo-magnets. As such, claim 65 is allowable for the same reasons as claim 63. Likewise, claim 66 depends on claim 65 and contains the limitations of claim 63. Claim 66 is also allowable for the same reasons as claim 63.

With regard to claim 67, the Applicant respectfully asserts that the combination of the Kagan, Blake and Watt references teach or suggest a method employing elongated neo-magnets and providing a molten metal pump with a pressurized passage having a flow width of more than ten times greater than its height. Applicant notes that Blake discloses a tube that does not include a "pressurizing passage with a flow width more than ten times greater than its height." Kagan does not teach or suggest this limitation either as it does pertain to pumps featuring a pressurizing passage but is directed to magnetized fins for guiding and stabilizing an endless, heat conducting casting belt.

The Applicant further notes that the flow width of ten times greater than the height of the passage has a significant functional purpose. This "flattened" passage allows the pole pieces 58, 59 to fit flush against the passage and be positioned close to the flow of molten metal M. *See* Application, pages 12-14, FIG. 2. This configuration facilitates the passage of the field of magnetic flux B into the molten metal M. *See id.* As such, the Applicant respectfully asserts that it would not be obvious to configure the passage as claimed in claim 67 in light of the teachings of the cited references.

#### Allowable Subject Matter

The Applicant acknowledges that claims 47-64 and 68 are allowed. The Applicant has amended claims 47-64 and 68 to correct the numbering of the claims, per the Examiner's request. Moreover, the Applicant has amended claim 68 to correct the spelling of "canceling".

### CONCLUSION

In light of the Applicant's amendments and above remarks, the Applicant believes that all claims are in a condition for allowance.

Applicant's has also enclosed a Petition in a separate letter for a one-month extension of time to file this Response. Authorization is hereby provided to charge the fee required, or to cover any deficiency in fee, to our Deposit Account No. 13-0235.

Respectfully submitted,

By 

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